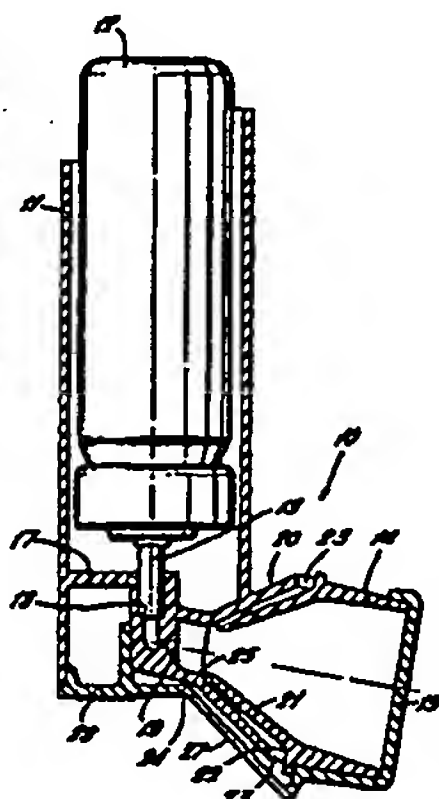


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(54) Medicament Inhalers

(57) An inhaler for medicament comprises a housing (11) adapted to receive a pressurised dispensing container (12) of medicament. A mouth piece (14) for insertion into the mouth of a user of the inhaler is connected by duct means to an outlet (13) of the container. Air inlet means are provided for allowing air into the inhaler when a user applies suction to the mouth piece. The air inlet means (22) are provided at a location axially between the air outlet for the duct means and the mouth piece and passage means are provided connecting the inlet to a location adjacent the outlet of the duct means. The arrangement is such that, in use, when a user inhales through the mouth piece an airflow is created from the inlet to the mouth piece and the airflow has a component directed away from the mouth piece towards the outlet of duct means.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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MEDICAMENT INHALERS

5 The invention relates to an inhaler for medicament particularly to an inhaler for transferring to a patient a metered dose of medicament contained in a pressurised dispensing container.

10 In known metered dose inhalers, the aerosol stream from a pressurised dispensing container is fired towards a patient or user of the inhaler into an air flow travelling in the same direction. In known devices, a user inhales through a mouth piece of the inhaler and creates an air flow through the container from air inlet holes which are generally at a part of the inhaler wall spaced from the mouth piece. The medicament is then released into this air flow at a point between the air inlet holes and the mouth piece so that it is travelling in the same direction as the air flow. Typically in such devices, there is no restriction in the air flow between the air inlet holes and the mouth piece. Because of this, a substantial air flow may be created by a user of the device and, because the medicament is fired into the air flow in the same direction as the air flow, the effect is that particles of medicament can attain quite substantial velocities. As inhalers of this type are normally designed to be as small as practical for the convenience of users, the distance between the point at which the medicament is fired into the air flow and the patient's mouth is usually quite small so that there is little distance to reduce the inertia of the particles of medicament with the result that the particles may impact in the oro-pharynx of a user with quite high velocity. This can be a problem with some medicaments.

15 In an effort to overcome this problem, devices have been produced in which the medicament is fired into a holding volume which allows the velocity of the medicament to be reduced and also allows some evaporation to occur.

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However, these devices with a holding volume tend to be of significantly larger size than the standard metered dose inhalers and therefore less convenient and attractive to users.

5 The present invention seeks to provide an inhaler which allows delivery of medicament to a user at reduced velocity without significantly increasing the size of the inhaler.

10 The invention provides an inhaler for medicament comprising a housing adapted to receive a pressurised dispensing container of medicament, a mouth piece for insertion into the mouth of a user of the inhaler, duct means connecting an outlet of the container with the mouth piece and air inlet means for allowing air into the inhaler when a user applies suction to the mouth piece in which the air inlet means are provided at a location axially between the air outlet of the duct means and the mouth piece, and passage means are provided connecting the inlet means to a location adjacent the outlet of the duct means so that, in use, when a user inhales through the mouth piece, an air flow is created from the inlet means to the mouth piece, the air flow having a component directed away from the mouth piece towards the outlet of the duct means.

15 Preferably the passage means includes a restriction to limit the air flow from the inlet means to the mouth piece.

20 The inlet means may comprise air inlet holes around the periphery of a portion of the inhaler adjacent to the mouth piece and the housing may include a wall portion in which the duct means is formed, the wall portion providing an air barrier between the housing and the mouth piece.

25 Further features and advantages of the invention will be apparent from the following description, by way of example, of a preferred embodiment of the invention, the description being read with reference to the accompanying drawing which shows a longitudinal cross-section through an actuator according to the invention.

Referring to the drawing, an actuator or inhaler 10

5 The container housing 11 is generally cylindrical and open at its upper end. A lower wall 17 of the housing 11 includes a thickened portion defining a seat 18 for receiving the tubular valve stem 13 of the container 12. The seat 18 communicates via a duct ending in an orifice 19 with the mouth piece 14.

The mouth piece 10 which may be generally circular or shaped to fit the mouth is at an angle somewhat in excess of 90° to the axis of the container housing 11. This angle is designed to present the mouth piece at a comfortable angle to the user of the device when the actuator is held in a hand of the user.

inner wall 21 being an extension of the south piece 14 and the outer wall 22 forming with the inner wall a restricted air flow passage from inlet air holes 23 provided in the outer wall around the periphery of the south piece to a restricted air inlet 25 adjacent a neck portion 24 of the device.

10 components of the actuator 10 may be plastics mouldings.

35 side of the housing 11 (as viewed in the drawing), to the  
north piece 14.

In use of the actuator 10, a patient or user holds the

5 It will be appreciated that the inlet air holes 23 are  
arranged downstream of the orifices 19 relative to the  
mouth piece 14, that is to say the inlet air holes 23 are  
axially closer to the mouth piece 14 than the neck portion  
24 and orifice 19. This ensures that when a user inhales  
10 through the mouth piece 14, the air flow is not directly

10 through the mouth piece 14, the air flow is not directly  
from a position upstream of the orifice 19 to the mouth  
piece 14 but has at least a component of reverse flow  
towards the orifice 19. The rate of air flow is also  
controlled by the restricted air inlet 23. The effect of  
15 the restriction and the reverse air flow is to create a  
turbulent air flow in the neck portion 24.

medicament from the container. The dose of medicament is projected by the pressure in the container 12 through the orifice 19 and then mixes with the turbulent air flow in the neck portion 24 and thence is inhaled by the user.

25 turbulence thereby created ensure that the velocity of  
medicament particles is relatively low when they enter the  
oro-pharynx region of the patient.

30 be used, the cover is removed by hinging it away from the  
mouth piece 14.

35

**CLAIM:**

medicament, a mouth piece for insertion into the mouth of a user of the inhaler, duct means connecting an outlet of the container with the mouth piece and air inlet means for allowing air into the inhaler when a user applies suction to the mouth piece in which the air inlet means are provided at a location axially between the air outlet of the duct means and the mouth piece, and passage means are provided connecting the inlet means to a location adjacent the outlet of the duct means so that, in use, when a user inhales through the mouth piece, an air flow is created from the inlet means to the mouth piece, the air flow having a component directed away from the mouth piece towards the outlet of the duct means.

passage means includes a restriction to limit the air flow from the inlet means to the south piece.

periphery of a portion of the inhaler adjacent to the mouth piece.

which the duct means is formed, the wall portion providing an air barrier between the housing and the north piece.

☐ UK ☐ (Edition 1) ☐ ASX (TBC, TBA, TBD)

(7) Int Cl (Edition 5) A61B

**Databases (see over)**

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**Search Examiner**

## W. STODOLSKY

Date of Search

**AUGUST 1993**

Documents considered relevant following a search in respect of claims 1-4

Category (see cover)	Identity of documents and relevant passages	Relevant to claim(s)
X	GB 1297993 (RIKER) - Figure 2, mouthpiece 46, portion of ducting 122, air inlet	1-4
X	GB 1270372 (RIKER) - airstream entering inlet 61 will have a component facing ducting defined by horizontal section of portion 35; Figure 3 etc	1 AT LEAST
X	WO 87/04254 A1 (BRACO) - Figure 1, air inlet 6, passage between inlet 6 and inlet 8, duct 22 etc	1

Category	Identity of document and relevant passages	Relevance to claim

#### Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

S: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).